INSTALLATION RESTORATION PROGRAM

OHIO AIR NATIONAL GUARD
TOLEDO EXPRESS AIRPORT, SWANTON, OHIO

PROJECT MANAGEMENT PLAN

FINAL

HAZWRAP SUPPORT CONTRACTOR OFFICE
Oak Ridge, Tennessee 37831
Operated by MARTIN MARIETTA ENERGY SYSTEMS, INC.
For the U.S. DEPARTMENT OF ENERGY under contract DE-AC05-840R21400

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The site investigation work plan consists of four sections; work plan, project management plan, quality assurance project plan, and the project health and safety plan. The plans describe the activities to be performed during the field investigation to determine the presence or absence of contamination at the Installation Restoration Program sites identified at the Ohio Air National Guard, Swanton, Ohio

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TOLEDO EXPRESS AIRPORT, SWANTON OHIO

PROJECT MANAGEMENT PLAN

FINAL

Submitted to:

National Guard Bureau
Air National Guard Support Center
Andrews Air Force Base, Maryland 20331

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For the

U.S. Department of Energy
Under Contract No. DE-AC05-840R21400

SAIC Project No. 1-827-03-350-02

September 1990

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LIST OF ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
ANG	Air National Guard
ANGB	Air National Guard Base
ANGSC	Air National Guard Support Center
ARARs	Applicable or Relevant and Appropriate Requirements
ASTM	American Society for Testing and Materials
AVGAS	Aviation Gasoline
BLS	Below Land Surface
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (1980)
CLP	Contract Laboratory Program
CWA	Clean Water Act
DOD	Department of Defense
DOE	Department of Energy
DOT	Department of Transportation
DQOs	Data Quality Objectives
ECD	Electron Capture Detector
ELSA	Emergency Life Support Apparatus
EMT	Emergency Medical Technician
EPA	Environmental Protection Agency
ETG	Environmental Technology Group
FFS/RM	Focused Feasibility Study/Remedial Measures
FID	Flame Ionization Detector
FS	Feasibility Study
FTA	Fire Training Area
FWQC	Federal Water Quality Criteria
GC/MS	Gas Chromatography/Mass Spectrometry
gpm	Gallons Per Minute
HAZWRAP	Hazardous Waste Remedial Actions Program
HMTC	Hazardous Materials Technical Center
I.D.	Inside Diameter
IDLH	Immediately Dangerous to Life or Health
IRP	Installation Restoration Program
LOAEL	Lowest-Observable-Adverse-Effect Level

LIST OF ACRONYMS (Continued)

MCLs	Maximum Contaminant Levels
MCLGs	Maximum Contaminant Level Goals
MPRSA	Marine Protection, Research, and Sanctuaries Act
MSL	Mean Sea Level
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MUL	Maximum Use Limit
NBS	National Bureau of Standards
NGB	National Guard Bureau
NIOSH	National Institute for Occupational Safety and Health
NOAEL	No-Observable-Adverse-Effect Level
O.D.	Outside Diameter
OEPA	Ohio Environmental Protection Agency
OH ANG	Ohio Air National Guard
OSHA	Occupational Safety and Health Administration
OWS	Oil/Water Separator
PA	Preliminary Assessment
PAHs	Polynuclear Aromatic Hydrocarbons
PEL	Permissible Exposure Limit
PF	Protection Factor
PM	Project Manager
PMP	Project Management Plan
POL	Petroleum, Oil, and Lubricants
POTW	Publicly Owned Treatment Works
ppm	Parts Per Million
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RPD	Relative Percent Difference
SAIC	Science Applications International Corporation
SARA	Superfund Amendments and Reauthorization Act (1986)
SCBA	Self Contained Breathing Apparatus

LIST OF ACRONYMS (Continued)

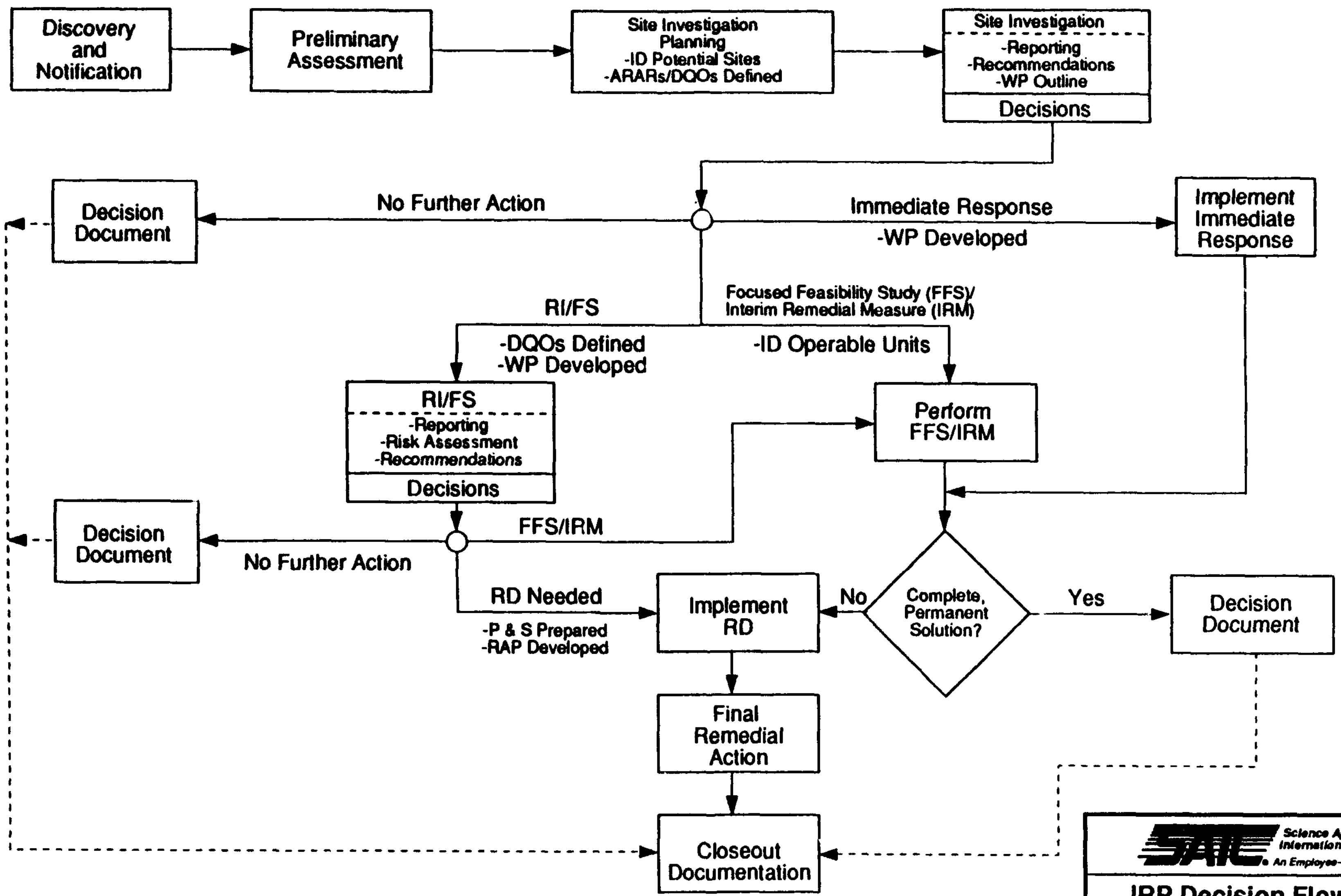
SDWA	Safe Drinking Water Act
SHD	Safety and Health Director
SI	Site Investigation
SOW	Statement of Work
SPT	Standard Penetration Test
SSHC	Site Safety and Health Coordinator
TCA	Trichloroethane
TCE	Trichloroethene
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act
USAF	U.S. Air Force
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
UST	Underground Storage Tank
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound
WWTP	Wastewater Treatment Plant

1. INTRODUCTION

The U.S. Department of Defense (DOD) has initiated the Installation Restoration Program (IRP) to identify and control environmental contamination resulting from past usage, storage, handling, and disposal of hazardous substances at DOD facilities. Section 120 of the Superfund Amendments and Reauthorization Act (SARA) of 1986 requires that IRP activities adhere to procedures specified in the National Contingency Plan (NCP) Final Rule [55 FR 8666]. The NCP details a sequence of steps to be followed when investigating and cleaning up hazardous waste sites. This sequence begins with the discovery of a hazardous waste release or threat of release, and ends with a permanent remedy to eliminate or minimize this release or threat of release and long-term monitoring of the remediation effort. Figure 1-1 depicts the steps in this process and shows decision points for selecting the next NCP step. The following briefly describes each step in the sequence:

- **Preliminary Assessment** -- Available information is gathered on the source, nature, extent, and magnitude of hazardous substance release or threat of release.
- **Site Investigation (SI)** -- An SI will be performed and samples of various media (water and soils) will be collected to determine if contamination is present at the sites under consideration. In addition, a baseline risk assessment will be conducted to establish whether an immediate threat or potential threat exists to persons living or working near the site.
- **Remedial Investigation (RI)** -- Onsite investigative procedures (including extensive sampling) are conducted to identify contaminants and their migration pathways and to assess potential risks to public health and the environment.
- **Feasibility Study (FS)** -- Potential remedial action alternatives for the site are evaluated in terms of their cost and effectiveness.
- **Remedial Action** -- The RAP agreed to by DOD and EA is carried out at the site.
- **Remedial Design** -- Once a remedial action is selected and approved, a design of the treatment unit will be accomplished.

The Air National Guard (ANG), through a U.S. Air Force (USAF) interagency technical support agreement with the U.S. Department of Energy (DOE), uses Martin Marietta Energy Systems, Inc. (MMES) to provide technical assistance



Acronyms:

ARARs: Applicable or Relevant and Appropriate Requirements
DQOs: Data Quality Objectives
RD: Remedial Design
RAP: Remedial Action Plan
WP: Work Plan

SAIC Science Applications International Corporation, An Employee-Owned Company

IRP Decision Flow Diagram for Each Site

Ohio Air National Guard
Toledo Express Airport
Swanton, Ohio

Figure: 1-1 | Project: 1-827-03-350-02

for implementation of the ANG IRP. Science Applications International Corporation (SAIC) has been retained by Martin Marietta Energy Systems, Inc. (Energy Systems) under the Hazardous Waste Remedial Actions Program (HAZWRAP) to conduct a Site Investigation (SI) at the Ohio Air National Guard facility located near the Toledo Express Airport in Swanton, Ohio (herein referred to as Toledo Air National Guard Base [ANGB] or the Base) and at the Camp Perry ANG Station in Port Clinton, Ohio. This Project Management Plan (PMP) discusses the organization, staffing, and scheduling for the SI project.

1.1 PROJECT OBJECTIVES

The overall objective of the ANG IRP is to identify potential environmental problem sites at ANG installations and to provide timely remediation to protect public health and the environment from confirmed and quantified contamination associated with past installation activities. During the Preliminary Assessment (PA), which was conducted by the Hazardous Materials Technical Center (HMTC) in 1988, nine sites of concern were identified at Toledo ANGB. An addendum will be prepared for a site at the Base where an underground storage tank (UST) was removed. No sites have been identified at Camp Perry Station; therefore, no further discussion of that facility is provided in this document. The eight identified sites being considered under the present SI are:

- Site 1: Fire Training Area No. 1
- Site 2: Fire Training Area No. 2
- Site 3: Fire Training Area No. 3
- Site 4: Fire Training Area No. 4
- Site 5: POL Storage Area
- Site 6: Western Drainage Area
- Site 7: Eastern Drainage Area
- Site 8: Fire Training Area No. 5
- Site 9: Underground Storage Tank.

The following documents generated during the course of the IRP investigations at Toledo ANGB have been reviewed in developing the project plans:

- Draft Installation Restoration Program, Preliminary Assessment for 180th Tactical Fighter Group, Ohio Air National Guard, Toledo Express Airport, Swanton, Ohio; Hazardous Materials Technical Center, February 1989.

- Statement of Work for Site Investigation, Remedial Investigation, Feasibility Study, and Remedial Design for Ohio Air National Guard Base at Toledo Express Airport, Swanton, Ohio; HAZWRAP Support Contractor Office, February 1989.

- Aerial photographs of Toledo ANGB, Monclova Township, 1975; Kucera and Associates, Inc.; 2 sheets.

- Topographic map of Toledo ANGB, Monclova Township, 1975; Kucera and Associates, Inc.; 2 sheets.

- Base utility maps; Toledo ANGB; 1988 revisions, 11 sheets.

- Selected logs of borings drilled on Toledo ANGB; Toledo ANGB.

1.2 PROJECT MANAGEMENT PLAN

This PMP identifies the objectives, conceptual approach, and activities to be performed at each of the sites under investigation and documents the decisions and evaluations made during the scoping phase of the project. The PMP also provides the technical methodologies for proposed field activities and procedures for the evaluation of site-specific areas, and recommends environmental monitoring program activities, permit requirements, appropriate or relevant guidelines or requirements, and Toledo ANGB responsibilities. The technical approach for characterizing each site and specific rationale to substantiate the approach are discussed in the following sections of the PMP, which includes the following information:

- Section 2 -- Analysis and summary of the site background and physical setting, including a description of each site to be investigated, regional and local geology and hydrogeology, and other environmental characteristics or features that are potentially significant to the evaluation of findings

- Section 3 -- Initial evaluation of each site to be investigated, including discussion of known or suspected wastes and sources, potential pathways, known data gaps, and applicable or relevant and appropriate requirements (ARARs)

- Section 4 -- Description of the SI tasks, including the technical approach to site characterization, a rationale for selection of this approach, data quality objectives (DQOs), and decision criteria

- Section 5 -- Reporting requirements

- Section 6 -- Project management

- Section 7 -- References.

2. SITE BACKGROUND AND SETTING

This section presents information regarding the sites of concern and generalities of the physical setting around the Toledo Air National Guard Base (ANGB). This information will be updated as the project proceeds, and updated information will be incorporated into draft and final project documents.

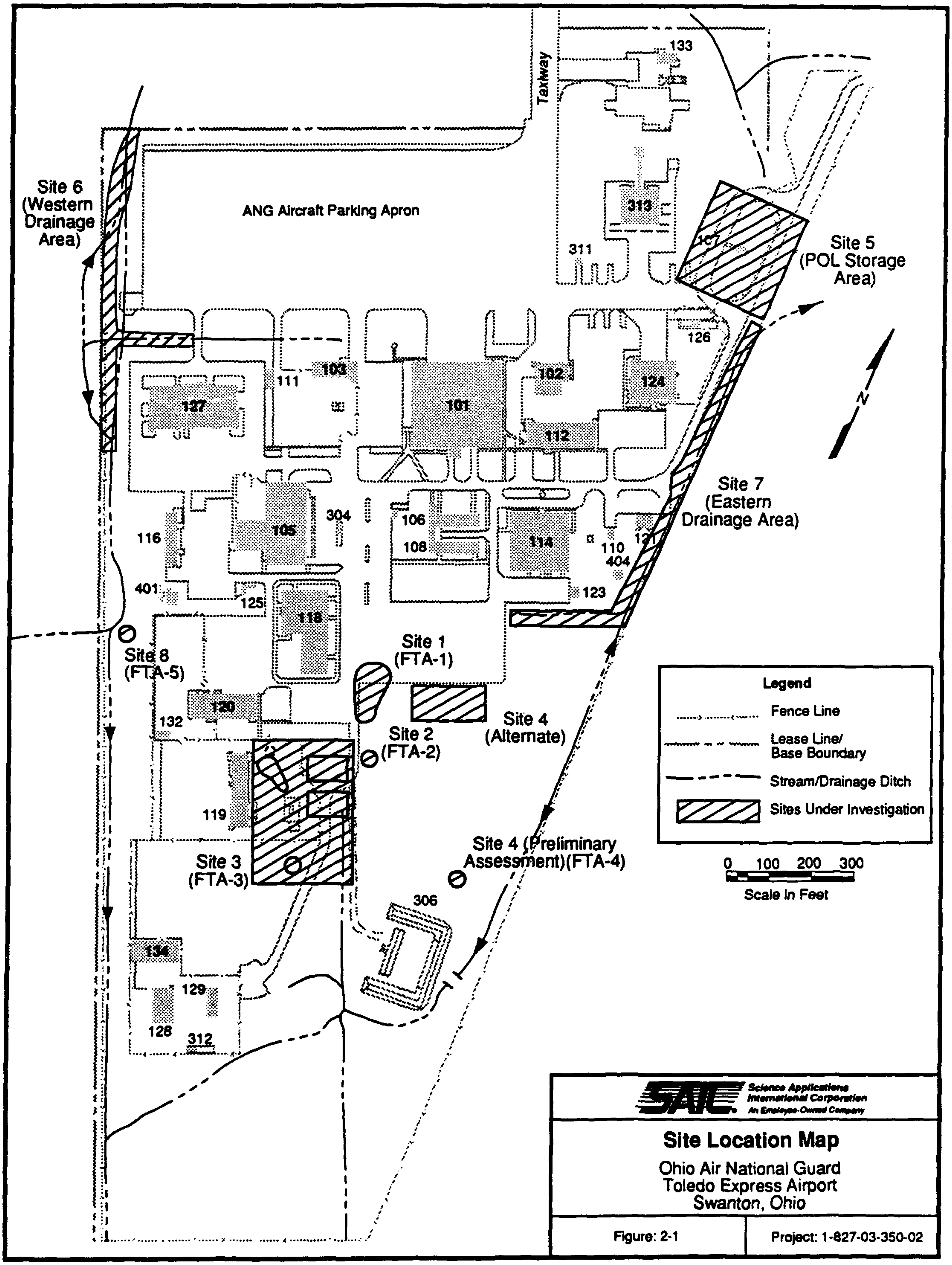
2.1 PHYSICAL SETTING

The Ohio Air National Guard (OH ANG) maintains its 180th Tactical Fighter Group at facilities located southwest of Toledo, Ohio at the Toledo Express Airport in Swanton, Ohio. The Base encompasses an area of approximately 78 acres in Monclova Township, Lucas County, and is bordered to the north and west by the Toledo Express Airport and on the east and south by agricultural and commercial properties. The nearest residential properties are located within 1,000 feet of the easternmost Base boundary. Before 1957, the area on which the Base is constructed was undeveloped marshy lowlands. The Base is approximately 16 miles southwest of the present shore of Lake Erie and is northwest of the Maumee River. Surface topography on the Base ranges from an approximate elevation of 660.0 feet above mean sea level (MSL) to 666.0 feet above MSL.

The major activities at the Base that may have produced potentially hazardous wastes include aircraft maintenance; fuel, oil and lubricant management; fire training exercises; and ground vehicle maintenance. Activities related to the generation, management, or disposal of waste products have resulted in the identification of eight sites with a potential for environmental contamination:

- Site 1: Fire Training Area No. 1
- Site 2: Fire Training Area No. 2
- Site 3: Fire Training Area No. 3
- Site 4: Fire Training Area No. 4
- Site 5: POL Storage Area
- Site 6: Western Drainage Area
- Site 7: Eastern Drainage Area
- Site 8: Fire Training Area No. 5.

Each of these sites is described below and shown in Figure 2-1.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Lease Line/ Base Boundary
Stream/Drainage Ditch
Sites Under Investigation
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Scale in Feet
N
Science Applications International Corporation
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Site Location Map
Ohio Air National Guard
Toledo Express Airport
Swanton, Ohio
Figure: 2-1
Project: 1-827-03-350-02

2.1.1 Site 1: Fire Training Area No. 1

Fire Training Area No. 1 (FTA-1) was located approximately 70 feet southeast of Building 118 in an open field. The location of this site was estimated by Base personnel for the Preliminary Assessment (PA) and reportedly consisted of a 200-foot diameter, surficial circular berm. This construction method probably reflects the relatively shallow water table at the site. It is not known if the berm area contained an artificial fill bottom or if access notches were cut into the berm that may have allowed excess liquids to drain following the fire training exercises. The location of Site 1 was re-evaluated by Base personnel using aerial photographs from 1963, 1969, and 1972, and the area of concern, based on this re-evaluation, is shown in Figure 2-1.

Fire training exercises reportedly were conducted at this location an average of 18 times per year from the late 1950's until 1966, when use of FTA-1 was discontinued because of the construction of a parking lot immediately to the north of the site. Routine training procedures were to soak the ground in the FTA with water before igniting the flammable materials. Base personnel estimate that an average of 250 to 500 gallons of flammable liquids were used per exercise. Assuming that 70 percent (HMTC estimate) of the flammable materials were consumed during fire training exercises, approximately 13,500 to 27,600 gallons of unconsumed flammable liquid may have seeped into the soils comprising the berm and subsequently into the subsurface soils and groundwater. The fate of the berm soils at the FTA is unknown. Before 1961, the most common liquid used for fire training was aviation gasoline (AVGAS). In addition, JP-4 and flammable liquids from Base shops, including waste oils, PD-680, and thinners, were burned at FTA-1 (HMTC 1989). Visual evidence of FTA-1 is not apparent at the location reported in the PA.

2.1.2 Site 2: Fire Training Area No. 2

Fire Training Area No. 2 (FTA-2) was used as the main location for Base fire training activities between 1966 and 1978. The site was precisely located during the onsite inspection (May 1989) using a 1975 aerial photograph of the Base, and visual evidence of the former berm area was observed at the site. FTA-2 was located 225 feet southeast of the southern edge of the

existing parking lot, as measured along the unpaved access road to the target range. The center of the berm area was located approximately 30 feet to the east of the road, and the berm had a diameter of 50 feet. The aerial photograph suggests that the bottom of the berm area was artificially filled.

As with FTA-1, the berm area was flooded with water before each fire training exercise. Base personnel estimate that approximately 250 to 500 gallons of flammable liquid were used per exercise and that approximately 18 exercises were conducted per year. The majority of the fuel burned at this site was JP-4; however, small quantities of combustible liquid wastes (e.g., oils, solvents, and strippers) from the Base shops also were used in the FTA (HMTC 1989). Assuming that 70 percent (HMTC estimate) of the flammable materials were destroyed during fire training exercises, approximately 16,200 to 32,400 gallons of flammable liquid may have seeped into the berm soils and potentially into soils and groundwater beneath the berm area.

2.1.3 Site 3: Fire Training Area No. 3

According to Base personnel, Fire Training Area No. 3 (FTA-3) was located within a presently fenced area at the Base motor pool (Building 119). This area reportedly was used only once or twice in the early 1970's and then abandoned because of its proximity to planned construction sites and complaints from airport personnel about smoke blowing across the runway. The FTA-3 site was covered with asphalt in 1977. During the PA, it was estimated that a total of 500 gallons of JP-4 may have been used at FTA-3, with a potential release of approximately 150 gallons of fuel from FTA-3, assuming a 70 percent burn efficiency and no retention of unconsumed fuel by the berm materials.

Aerial photographs from 1963, 1969, and 1972 indicate that the general area of Site 3 included several bermed areas that may have been used for fire training exercises. The nature of the activities conducted within these areas is presently unknown; however, the bermed areas will be added to the Site Investigation (SI), as an expansion of the PA Site 3 boundary.

2.1.4 Site 4: Fire Training Area No. 4

Fire Training Area No. 4 (FTA-4) reportedly was located immediately north of the small arms firing range. This FTA was used for 6 months in the early 1970's immediately after fire training exercises were discontinued at FTA-3. The precise location, dimensions, construction method, and total number of exercises conducted at FTA-4 are unknown and the FTA could not be located by Science Applications International Corporation (SAIC) on aerial photographs from 1969, 1972, or 1975. Physical evidence of FTA-4 was not observed during the initial site meeting (May 1989) and no evidence of FTA-4 was observed on a 1975 aerial photograph of the Base. Base personnel indicate that FTA-4 may have been located east of FTA-1 based on the 1969 aerial photograph. This area will be investigated in addition to the PA location. A square, pad-like area observed on the 1975 aerial photograph immediately to the north of the firing range and approximately 100 feet to the west of the location of FTA-4 specified in the PA was identified by Base personnel as a former softball field. This FTA reportedly was abandoned because the sandy soil at the site would not retain water; thus, the fuel could not be floated before ignition. This suggests that the bottom of FTA-4 may have been composed of natural soils as opposed to artificial fill.

2.1.5 Site 5: POL Storage Area

Fuel storage and distribution at Toledo ANGB consists of a fenced yard housing four, 25,000-gallon capacity, unlined, steel underground storage tanks (USTs) that were installed in 1959 with no cathodic protection. The tanks are housed beneath the Building 107 pump station. In 1985, the tanks were ultrasonically inspected (but not pressure tested) as part of a construction project; no leaks in the tank walls were detected at that time. However, some soil, possibly contaminated by refueling operations, was excavated from the area. During the PA, interviewees reported numerous small spills (200 to 300 gallons) in this area since the mid-1970's. These spills may be responsible for a patterned area of stressed vegetation immediately east of the POL extending across the Base access road. A trench excavated by a maintenance crew in the area to the east was reported to have produced a JP-4 odor. The source of inventory variances at the POL has not been positively identified, but is thought by Base personnel to be related to handling losses combined

with accounting discrepancies and/or temperature variations. The possibility of tank leakage has not been definitively eliminated. A small drainage ditch between the POL Storage Area and the northern Base boundary has been included in Site 5 in the present SI (Figure 1-1).

2.1.6 Site 6: Western Drainage Area

The western drainage ditch runs parallel to the western Base boundary and receives storm drainage from the northwestern section of the Base property. The area of the ditch to be investigated will extend from the ditch area near the northern Base boundary to the area immediately south of Building 127. Site 6 also will include a drainage swale located north of Building 127. This drainage includes effluent from the oil/water separators (OWSs) located on this part of the Base that are not connected to the sanitary sewer system.

The western drainage ditch shows physical signs of inorganic and organic contamination, possibly resulting from petroleum products in the effluent discharged from the OWSs. Evidence of possible organic contamination also was observed in the drainage area in front of Building 127 during the May 1989 site visit. Surface water in the drainage ditch appeared to be stagnant during the May 1989 onsite meeting.

2.1.7 Site 7: Eastern Drainage Area

The eastern drainage ditch runs parallel to the eastern Base boundary and receives storm drainage from the eastern portion of the Base. The site boundaries were extended to the south and east by the National Guard Bureau (NGB) to an area beyond where the water treatment plant backwash is discharged to the ditch. This ditch receives drainage from the POL facility as well as the OWSs on the eastern part of the Base that are not connected to the sanitary sewer system. During an inspection of this area, suspected organic contamination was observed in the northern portion of this ditch, possibly resulting from petroleum products in the effluent discharged from the OWSs (HMTC 1989). A reddish-brown discoloration also was observed in the southern portion of the ditch, possibly resulting from backwash effluent from the water treatment operations conducted at Building 110. Surface water in the drainage ditch appeared to be stagnant, with an occasional oily sheen on the water surface, during the May 1989 site meeting.

2.1.8 Site 8: Fire Training Area No. 5

Site 8 contained the rubbled remains of a curbed concrete burn pad that was used for fire extinguisher training exercises. After an exercise was completed, the remaining water, fuel, and extinguisher byproduct mixtures were released through a discharge valve to an adjacent drainage ditch. The amount of training activity or the quantity of releases were not estimated.

2.1.9 Site 9: Underground Storage Tank Site

During the initial meetings at the Base between National Guard personnel and representatives of MMES and SAIC, an additional site was identified for investigation. This site was the former location of an underground fuel tank that was removed from service.

During the excavation of the tank, in November 1989, it was noted that free product was present on the groundwater in the pit. Actions were taken to remove the product. Subsequently, this site has been included in the SI to determine if contamination has migrated beyond the immediate area of the tank. Activities planned for this site are presented in the Work Plan Addendum.

2.2 AREA GEOLOGY

Regional and local geology of the Lucas County area and Toledo ANGB were derived from descriptions provided in the Base PA.

2.2.1 Soils

Soil development in Lucas County is the result of physical processes associated with Pleistocene glaciation, migration of the Lake Erie shoreline, and migration of the Maumee River. According to the U.S. Department of Agriculture (USDA) Soil Survey of Lucas County (1980), the region of Toledo ANGB is underlain by soils of the Udorthents loam, Ottokee fine sand, and Granby loamy fine sand. The hydraulic conductivity of these soils ranges between 1.41×10^{-2} and 4.24×10^{-3} cm/sec.

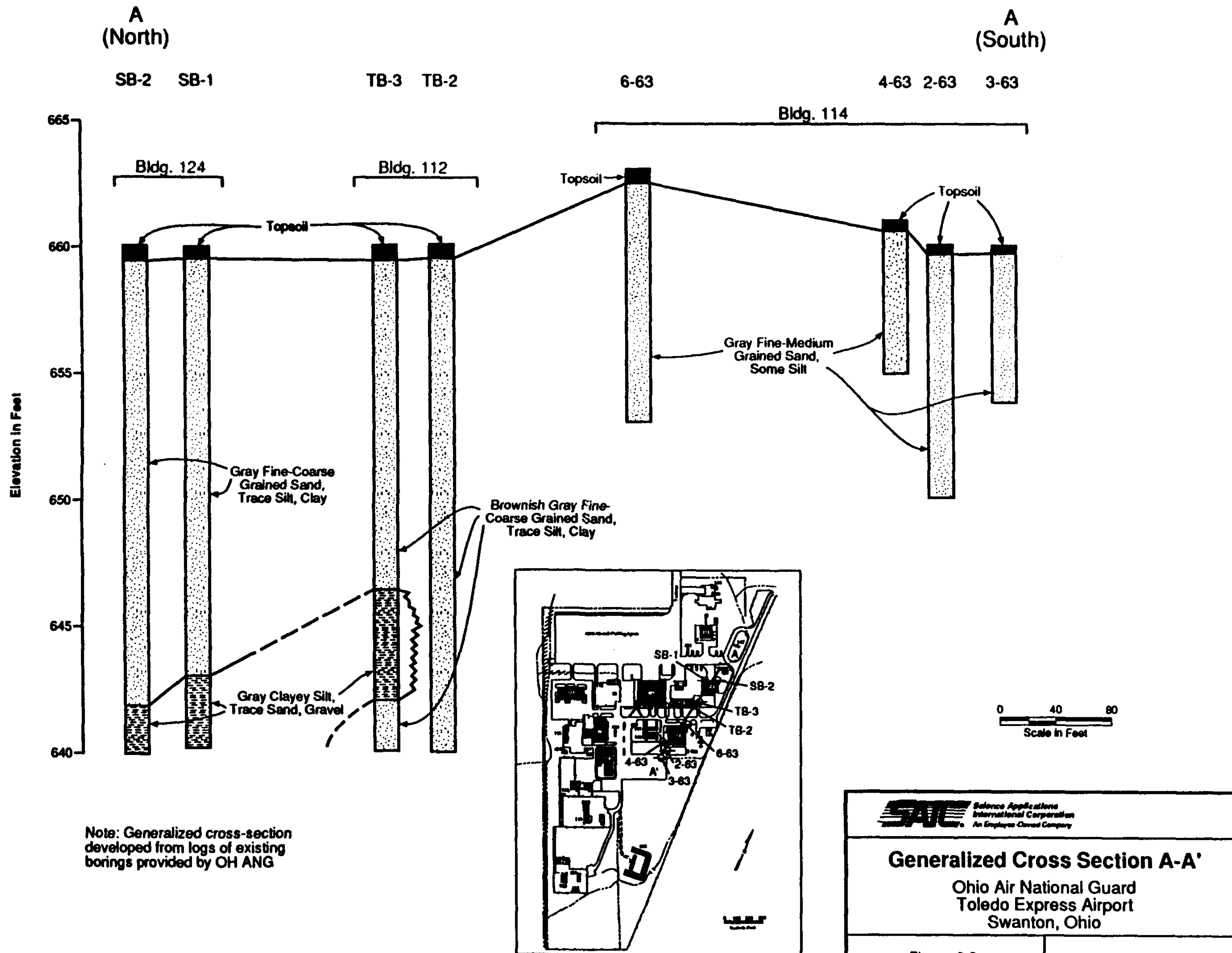
The Udorthents soil consists of nearly level to strongly sloping, loamy material. The soil in this unit generally consists of mixed organic and

inorganic material overlain by a layer of loamy soil material about 2 feet thick, and generally consists of calcareous clay and silty clay loam.

Ottokee sand is a moderately well-drained soil comprising broad beach ridges and oval sand dunes. The sand is found predominantly in the Oak Openings area, which is composed of a broad sand belt that extends diagonally through Lucas County west of Toledo and through the Base area. Sand in the area is typically 15 to 30 feet thick, uniformly fine- to medium-grained, and composed predominantly of quartz grains. The sand unit represents deposition by currents and waves from an ancestral Lake Erie that stood at an elevation as much as 200 feet higher than the modern lake (Forsyth 1968). The Oak Openings represents a strandline (beach) formed by one of at least eight distinct ancestral lake levels that have been identified by the elevations of its associated beaches.

The Granby soil is a very poorly drained soil occurring on outwash plains. The soil is found in irregularly shaped areas on broad flats and in long, narrow, concave areas. The areas in which the soil is found range from 2 to 200 acres. The soil receives runoff from adjacent, higher lying soils and is subject to ponding. The surface layer is black, loamy fine sand about 1 foot thick. The subsoil extends to a depth of approximately 25 inches. The upper part of the subsoil is mottled, dark gray, and very friable fine sand; the lower part is mottled, grayish brown, and loose fine sand.

Underlying the upper sand deposit are glacial units typically composed of an upper clay-rich deposit and a lower, sandy till deposit. Shallow boring logs from 30 foundation borings taken across the Base indicate that the area is underlain to a depth of approximately 15 to 25 feet by sandy soils consisting of yellow, brown, and gray brown silty fine to coarse grained sand with traces of clay and silt seams. Surficial evidence of the extensively sandy upper portion of the shallow aquifer can be seen in dredge spoils located on the adjacent property east of the Base. There is also evidence of a massive clay layer occurring beneath the sand that may act as a lower boundary for investigation activities. Cross-sections developed from the available boring logs are shown in Figures 2-2 and 2-3.



Note: Generalized cross-section developed from logs of existing borings provided by OH ANG

Science Applications International Corporation
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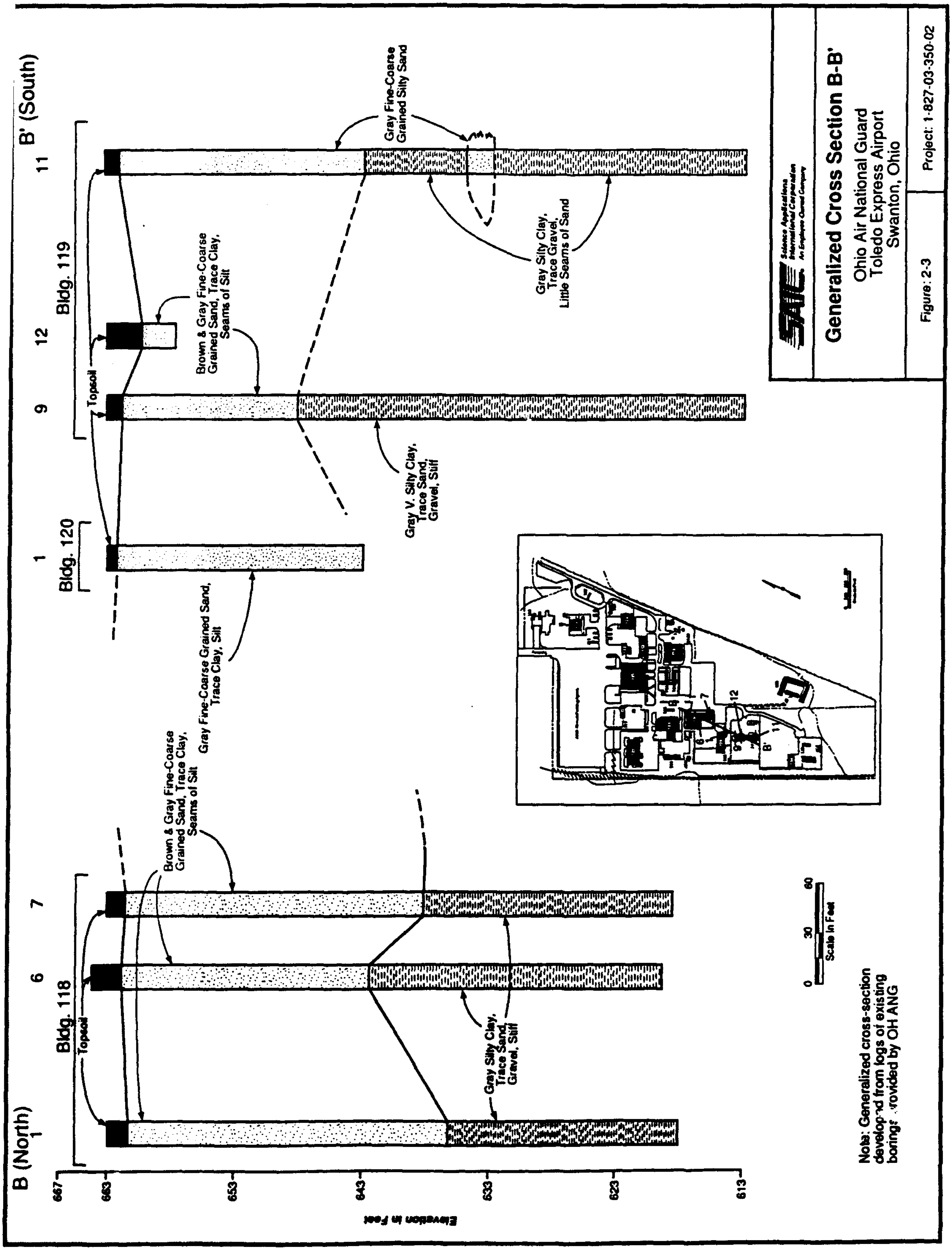
Generalized Cross Section A-A'

Ohio Air National Guard
Toledo Express Airport
Swanton, Ohio

Figure: 2-2 | Project: 1-827-03-350-02



B (North)
B' (South)
Bldg. 118
Bldg. 120
Bldg. 119
1
6
7
1
9
12
11
Topsoil
Brown & Gray Fine-Coarse Grained Sand, Trace Clay, Seams of Silt
Gray Fine-Coarse Grained Sand, Trace Clay, Silt
Gray Silty Clay, Trace Sand, Gravel, Silt
Gray V. Silty Clay, Trace Sand, Gravel, Silt
Gray Fine-Coarse Grained Silty Sand
Gray Silty Clay, Trace Gravel, Little Seams of Sand
Elevation in Feet
667
663
653
643
633
623
613
0
30
60
Scale In Feet
Note: Generalized cross-section developed from logs of existing borings provided by OH ANG
SAIC
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Generalized Cross Section B-B'
Ohio Air National Guard
Toledo Express Airport
Swanton, Ohio
Figure: 2-3
Project: 1-827-03-350-02

2.2.2 Bedrock Geology

The portion of Lucas County where Toledo ANGB is located is underlain by limestones and dolomites of Silurian and Devonian ages. The bedrock is covered with fluvial sediments and glacial drift, ranging from a thin veneer to 220 feet in thickness. A shallow preglacial valley buried in this section of Lucas County beneath the Base contains as much as 80 to 120 feet of clay, sand, and gravel. The buried valleys are remnants of an early drainage system, which incised valleys into the bedrock before glaciation.

Upper Devonian strata in northwestern Ohio consist of the Ohio shale, which is 300 feet thick and interbedded with minor, dense, dark brown dolomite. Beneath the Ohio shale is the Middle Devonian strata of the Traverse Group and the Dundee Limestone. The Traverse Group is composed of the 18- to 54-foot thick Tenmile Creek dolomite underlain by the 30-foot thick Silica Formation. The Silica Formation is underlain by the 50-foot thick Dundee Limestone. The Detroit River Group underlies the Dundee Limestone and is composed of undifferentiated dolomite formations and the Sylvania Sandstone. The Detroit River Group is approximately 100 feet thick.

Unconformably underlying the Devonian strata is a thick sequence of Silurian dolomites, including the Raisin River and the Tymochtee, Greenfield, and Lockport Formations. The total thickness of these formations is approximately 700 feet. The Rochester Shale underlies the dolomite formations.

In the vicinity of Toledo ANGB, the uppermost bedrock unit is mapped as the Silurian-aged Greenfield Formation, which consists of an approximately 45-foot thickness of light gray to buff-colored dolomite (HMTC 1989).

2.3 AREA HYDROLOGY AND HYDROGEOLOGY

Regional and local descriptions of the hydrology and hydrogeology are presented in this section based on information presented in the PA.

2.3.1 Hydrology

Hydrologically, Toledo ANGB lies in the Maumee River drainage basin. The nearest major surface water to the Base is Swan Creek, which flows from the

western portion of Lucas County toward the Maumee River, the eastern boundary of the county. Swan Creek is approximately 3 miles south of the Base at its nearest point. Storm drainage from the northwestern portion of the Base flows into an intermittently used drainage ditch lying along the western boundary of the Base. Storm drainage from the eastern portion of the Base flows into an intermittently used drainage ditch lying along the eastern boundary of the Base. The drainage ditches combine outside of the Base boundaries and eventually drain into Swan Creek.

2.3.2 Hydrogeology

Regional groundwater flow patterns in the unconsolidated sediments underlying Lucas County are unknown and are being studied by the U.S. Geological Survey (USGS) (personal communication, J. Raab 1989). Groundwater for domestic and agricultural supplies are available from sand and gravel deposits found at depths up to 100 feet. Groundwater occurs in unconsolidated deposits beneath the Base at a depth of 2.5 to 3.0 feet below land surface (BLS). Flow directions and velocities are unknown, since only one shallow USGS well is located in the vicinity of the Base.

Well yields up to 300 gallons per minute (gpm) have been obtained from wells drilled to depths between 150 and 500 feet in the carbonate bedrock, generally in the Silurian strata. Groundwater occurs in the limestone and in fractures, joints, and solution channels; the yield from a well generally is proportional to the number of such openings intercepted by the well. The Base is located within a buried bedrock valley that underlies the Maumee River and trends to the northeast into Lake Erie at Toledo. The Base uses groundwater from one onsite supply well screened in bedrock at a depth of approximately 210 feet BLS.

2.4 METEOROLOGY

The Toledo area has a humid climate that is characterized by short periods of extreme heat and cold. Due to the proximity of Toledo to Lake Erie and the other Great Lakes, the climate is influenced by the moderating effects of these large bodies of water. The average annual temperature is 50°F, with an average monthly maximum temperature of 73°F in July and an average monthly

low temperature of 26°F in January. Toledo has an average annual precipitation of 33.41 inches based on the period between 1937 and 1977 (HMTC 1989).

2.5 CRITICAL ENVIRONMENTS

According to the Ohio Department of Natural Resources, Division of Wildlife, no endangered or threatened species of flora or fauna exist within a 1-mile radius of the Base. No critical habitats, wetlands, or wilderness areas are located within a 1-mile radius of the Base (HMTC 1989).

3. INITIAL EVALUATION

The initial evaluation of the information available for the eight sites of concern and the hydrogeologic media underlying the site provides a baseline for the characterization of known or suspected wastes or sources, delineation of potential transport pathways, and identification of data gaps and applicable or relevant and appropriate requirements (ARARs) for risk assessment.

3.1 KNOWN OR SUSPECTED WASTES AND SOURCES

Since five of the eight sites (Sites 1, 2, 3, 4, and 8) to be investigated at the Toledo Air National Guard Base (ANGB) are abandoned Fire Training Areas (FTAs), the contaminants potentially generated by the training activities at these sites will be similar. The use of JP-4 as a primary ignition source was prevalent at these sites, in addition to subsidiary amounts of waste solvents and oils. Waste products anticipated as a result of the fire training activities include lead and other heavy metals, byproducts of unburned fuel, solvents, and the incomplete combustion of the ignition fluids. These byproducts may include polynuclear aromatic hydrocarbons (PAHs).

Sites 6 and 7 consist of the western and eastern drainage ditches, respectively. Suspected waste streams that discharge to these ditches may include waste solvents from Base shops, oil/water separator (OWS) discharges, deicers, and backwash from the water treatment plant.

Suspected contaminants from the POL Storage Area (Site 5) include JP-4 from fuel handling practices. The potential for this site to be a continuing source of contaminants is unknown.

3.2 POTENTIAL ENVIRONMENTAL PATHWAYS

Potential pathways for the release of contaminants to the environment from the sites of concern at Toledo ANGB include groundwater and surface water. Airborne contaminants have not been documented to discharge from the sites under investigation. The first potential pathway consists of

extensive sandy aquifer materials that underlie the Base, combined with the shallow (2.5 feet below land surface [BLS]) groundwater table. These conditions indicate a strong potential for contaminant transport away from the fire training areas (FTA-1 through FTA-5) and the POL Storage Area. The extent to which the surface water in the ditch areas interacts with the groundwater is unknown.

Direct discharge from Base facilities to the surface ditches, which ultimately drain into streams extending off Base, indicates a second potential pathway for the transport of potentially hazardous materials through surface water. Flow rates in the ditches appear to be controlled by the discharge flow rate generated from outfalls and precipitation. The sites under investigation have little or no residual surface evidence of the activities that were previously conducted at each site; therefore, the surface transport of contaminants from the sites is not considered to be a viable general pathway, with the exception of the POL Storage Area (Site 5).

3.3 IDENTIFIED DATA GAPS

The sites at Toledo ANGB have not been previously investigated; therefore, information that will be collected during the Site Investigation (SI) at the eight sites at the Base includes:

- Site-specific geology, hydrogeology, and chemical data for groundwater, surface water, sediments, and soils
- Additional boring information
- Data on physical properties, grain size, hydraulic conductivity, and other properties of the aquifer and subsurface soils.

3.4 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

Section 121(d) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, addresses cleanup standards. In particular, the section provides that if a Federal criterion or standard, or a state standard more stringent than a Federal criterion or standard, is a legal ARAR to the circumstances at the waste site under evaluation, the cleanup must meet that standard. SARA lists the following Federal statutes that might

contain ARARs: the Toxic Substances Control Act (TSCA); the Safe Drinking Water Act (SDWA); the Clean Air Act (CAA); the Clean Water Act (CWA); the Marine Protection, Research, and Sanctuaries Act (MPRSA); and the Resource Conservation and Recovery Act (RCRA). Recent U.S. Environmental Protection Agency (EPA) guidance for Superfund cleanup considers the maximum contaminant levels (MCLs) established under SDWA as the main cleanup standards for groundwater that is currently or may potentially be used as a source of drinking water. Under these circumstances, the entire aquifer must be in compliance with the MCLs.

Several different types of ARARs have been established, including chemical-, action-, and location-specific ARARs, under which compliance by remedial actions may be required (52 FR 32496):

- **Chemical-specific ARARs** -- Health- or risk-based concentration limits or ranges in various environmental media for specific hazardous substances, pollutants, or contaminants. Examples of these are MCLs and maximum contaminant level goals (MCLGs), Federal and state ambient water quality criteria, and ambient air quality standards. Chemical-specific ARARs may define protective cleanup levels.

- **Action-specific ARARs** -- Controls or restrictions on particular types of activities related to management of hazardous substances, pollutants, or contaminants. Examples are RCRA regulations for closure of hazardous waste storage or disposal facilities, RCRA incineration standards, and pretreatment standards for discharge to publicly owned treatment works (POTWs) under the CWA. Action-specific ARARs may set controls or restrictions for particular treatment and disposal activities.

- **Location-specific ARARs** -- Restrictions on activities within specific locations, such as flood plains or wetlands. Examples include Federal and state siting laws for hazardous waste facilities and restrictions on sites on the National Register of Historic Places.

Although the eight Toledo ANGB sites are being investigated under a Federal program, the cleanup standards prescribed by the State of Ohio environmental cleanup rules also will be ARARs for remedial actions. A protective level, or maximum concentration of hazardous substance that can remain, ultimately is determined based on a site-specific risk and endangerment assessment (evaluating overall "protectiveness") and consideration of the selected ARARs. Endangerment assessments must be in accordance with EPA

guidance, and will be based on reasonable maximum exposure scenarios for receptors at risk. The burden for proposing and defending a protective level at a given site rests with the responsible party.

Tables 3-1 and 3-2 provide a comprehensive and current list of chemical-specific ARARs. Because the specific compounds present at the site are unknown at this time, the list provides a summary of all Federal ARARs currently available. The ARARs will be refined throughout the SI process, as a better understanding of site contaminants, distribution, and remedial measures is gained. Ohio Environmental Protection Agency (OEPA) has not currently adopted groundwater quality standards. State ARARs, as they are adopted, that are determined to be more stringent than Federal ARARs will be identified, as will other Federal and State criteria, advisories, and guidance and local ordinances, as appropriate. Support agencies will be contacted for assistance in identifying ARARs and in confirming their applicability or relevance and appropriateness.

TABLE 3-1. SUMMARY OF USEPA DRINKING WATER STANDARDS, CRITERIA, AND GUIDELINES FOR PROTECTION OF HUMAN HEALTH (ug/L)

					These Columns Must Be Verified by IRIS		Water Quality Criteria for Protection of Human Health(g)						
							Ingestion of Drinking Water Only		Ingestion of Drinking Water and Aquatic Organisms		Ingestion of Aquatic Organisms Only		
Chemical	Practical Quantification Limits (a)	MCL (b)	MCLG (c)	Proposed MCLG(d)	Concentration at 10^{-6} Risk Level (e,f)	Concentration at RfD Level (e,f)	Threshold Toxicity Protection	10^{-6} Cancer Risk	Threshold Toxicity Protection	10^{-6} Cancer Risk	Threshold Toxicity Protection	10^{-6} Cancer Risk	ODW Health Advisory(h) Lifetime 70 kg Adult
Acenaphthene	10	-	-	-	-	-	20	-	-	-	-	-	-
Acenaphthylene	10	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	100	-	-	-	-	3500	-	-	-	-	-	-	-
Acrolein	5	-	-	-	-	-	540	-	320	-	780	-	
Acrylamide	-	-*	-	0	-	-	-	-	-	-	-	-	-
Acrylonitrile	5	-	-	-	0.06	-	-	0.063	0.058	-	-	0.65	-
Alachlor	-	-*	-	0	-	350	-	-	-	-	-	-	-
Aldicarb	-	-*	-	9	-	45.5	-	-	-	-	-	-	10
Aldrin	0.05	-	-	-	-	1.05	-	0.0012	-	0.000074	-	0.000079	-
Aluminum	-	50†	-	-	-	-	-	-	-	-	-	-	-
Anthracene	10	-	-	-	-	-	-	-	-	-	-	-	-
Antimony, total	30	-	-	-	-	14	146	-	146	-	45000	-	-
Arsenic, total	10	50*	-	50	-	-	-	0.025	-	0.0022	-	0.0175	-
Asbestos	-	-*	-	7.0(k)	-	-	-	0.030(k)	-	0.030(k)	-	-	-
Barium, total	20	1000*	-	1500	-	1750	-	-	1,000	-	-	-	1500
Benzene	2	5	0	-	1	-	-	0.67	-	0.66	-	40	-
Benzidine	-	-	-	-	0.0002	-	-	0.00015	-	0.00012	-	0.00053	-
Benzo(a)anthracene	10	-	-	-	-	-	-	j	-	j	-	j	-
Benzo(a)pyrene	10	-	-	-	-	-	-	j	-	j	-	j	-
Benzo(b)fluoranthene	10	-	-	-	-	-	-	j	-	j	-	j	-
Benzo(k)fluoranthene	10	-	-	-	-	-	-	j	-	j	-	j	-
Benzo(g,h,i)perylene	10	-	-	-	-	-	-	j	-	j	-	j	-
Beryllium, total	2	-	-	-	-	175	-	0.0039	-	0.0068	-	0.117	-
alpha-BHC	0.05	-	-	-	-	-	-	0.013	-	0.0092	-	0.031	-
beta-BHC	0.05	-	-	-	-	-	-	0.023	-	0.0163	-	0.0547	-
gamma-BHC (Lindane)	0.05	4*	-	0.2	-	10.5	-	0.017	-	0.0186	-	0.0625	2
Bis-2-chloroethylether	10	-	-	-	0.03	-	-	-	-	0.03	-	1.36	-
Bis(2-ethylhexyl) phthalate	10	-	-	-	50	700	21,000	-	15,000	-	50,000	-	-
Bromodichloromethane	1	100(i)	-	-	-	700	-	-	0.19	-	15.7	-	-
Bromoform	2	100(i)	-	-	-	700	-	-	-	-	-	-	-
2-Butanone (MEK)	10	-	-	-	-	1,750	-	-	-	-	-	-	170
Cadmium, total	1	10*	-	5	-	-	10	-	10	-	-	-	5
Carbofuran	-	-*	-	36	-	175	-	-	-	-	-	-	36
Carbon disulfide	5	-	-	-	-	3,500	-	-	-	-	-	-	-
Carbon tetrachloride	1	5*	0	-	0.3	24.5	-	0.42	-	4	-	6.94	-
Chlorobenzene	2	10†	-	60	-	-	488	-	488	-	-	-	300
Chlordane	0.1	-*	-	0	0.027	1.75	-	0.022	-	0.00046	-	0.00048	-
Chloride	-	250,000†	-	-	-	-	-	-	-	-	-	-	-
Chloroform	0.5	100(i)	-	-	-	350	-	0.19	-	0.19	-	15.7	-
2-Chloronaphthalene	10	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorophenol	5	-	-	-	-	-	-	-	-	-	-	-	-
3-Chlorophenol	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chlorophenol	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromium (total)	10	50*	-	120	-	-	-	-	-	-	-	-	120
Chromium (hexavalent)	-	-	-	-	-	175	50	-	50	-	-	-	-
Chromium (trivalent)	-	-	-	-	-	35,000	179,000	-	170,000	-	3,433,000	-	-
Chrysene	10	-	-	-	-	-	-	j	-	j	-	j	-
Color	-	15 units†	-	-	-	-	-	-	-	-	-	-	-
Copper, total	60	1,000*†	-	1300	-	-	1,000	-	-	-	-	-	-
Corrosivity	-	noncorrosive†	-	-	-	-	-	-	-	-	-	-	-
Cyanide	40	-	-	-	-	700	200	-	200	-	-	-	154

TABLE 3-1. SUMMARY OF USEPA DRINKING WATER STANDARDS, CRITERIA, AND GUIDELINES FOR PROTECTION OF HUMAN HEALTH (Continued)
(ug/L)

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DDD	0.1	-	-	-	-	-	-	-	-	-	-	-	-
DDE	0.05	-	-	-	-	-	-	-	-	-	-	-	-
DDT	0.1	-	-	-	-	17.5	-	0.0012	-	0.000024	-	0.000024	-
2,4-D	10	100*	-	70	0.01	350	-	-	-	100	-	-	70
DBCP	5	-	-	0	-	-	-	-	-	-	-	-	-
Dibenzo(a,h)anthrancene	10	-	-	-	-	-	-	1	-	1	-	1	-
Dibutylphthalate	2	-	-	-	-	3,500	44,000	-	34,000	-	154,000	-	-
1,2-Dichlorobenzene(o)	2	-*/10†	-	-	-	-	470	-	400	-	2,600	-	620
1,3-Dichlorobenzene(m)	5	-/5†	-	-	-	-	470	-	400	-	2,600	-	620
1,4-Dichlorobenzene(p)	2	75/5†	75	-	-	-	470	-	400	-	2,600	-	75
1,2-Dichloroethane	0.5	5	0	-	0.4	-	-	-	-	0.94	-	243	-
1,1-Dichloroethene	1	7	7	-	0.06	315	-	0.033	-	0.033	-	1.85	7
cis-1,2-Dichloroethene	-	-*	-	70	-	-	-	-	-	-	-	-	70
trans-1,2-Dichloroethene	1	-*	-	70	-	-	-	-	-	-	-	-	70
Dichloromethane	5	-	-	-	5	2,100	-	0.19	-	0.19	-	15.7	-
1,2-Dichloropropane	0.5	-*	-	6	-	-	-	-	-	-	-	-	-
Dichloropropene	5	-	-	-	-	10.5	87	-	87	-	14,000	-	-
Dieldrin	0.5	-	-	-	-	-	-	0.0011	-	0.000071	-	0.000076	-
Diethyl phthalate	5	-	-	-	-	28,000	-	-	350,000	-	1,800,000	-	-
Dimethyl phthalate	5	-	-	-	-	-	350,000	-	313,000	-	2,900,000	-	-
3-3'-Dichlorobenzidine	20	-	-	-	-	-	-	-	-	0.01	-	0.02	-
2,3-Dichlorophenol	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	5	-	-	-	-	105	3,090	-	3,090	-	3,090	-	-
2,5-Dichlorophenol	-	-	-	-	-	-	-	-	-	-	-	-	-
2,6-Dichlorophenol	10	-	-	-	-	-	-	-	-	-	-	-	-
3,4-Dichlorophenol	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	5	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	0.2	-	-	-	-	-	-	0.11	-	0.11	-	9.1	-
Dioxane	150	-	-	-	-	-	-	-	-	-	-	-	-
1,2-Diphenylhydrasine	-	-	-	-	0.05	-	-	0.046	-	0.042	-	0.56	-
Endosulfan	0.1	-	-	-	-	1.75	138	-	74	-	159	-	-
Endosulfan sulfate	0.5	-	-	-	-	-	-	-	-	-	-	-	-
Endrin	0.1	0.2	-	-	-	-	1	-	1	-	-	-	0.32
Epichlorohydrin	-	-*	-	0	3	70	-	-	-	-	-	-	-
Ethylbenzene	2	-*/30†	-	680	-	3,500	2,400	-	1,400	-	3,280	-	680
Ethylenedibromide	5	-*	-	0	-	-	-	-	-	-	-	-	-
Ethyleneglycol	-	-	-	-	-	70,000	-	-	-	-	-	-	7000
Fluoranthene	10	-	-	-	-	-	188	-	42	-	54	-	-
Fluorene	10	-	-	-	-	-	-	-	-	-	-	-	-
Fluoride	-	2,000†	-	-	-	-	-	-	-	-	-	-	-
Foaming agents	-	500†	-	-	-	-	-	-	-	-	-	-	-
Halomethanes	-	0.10	-	-	-	-	-	0.19	-	0.19	-	15.7	-
Heptachlor	0.05	-*	-	0	0.008	17.5	-	0.011	-	0.00028	-	0.00029	-
Heptachlor epoxide	1	-*	-	0	0.004	0.455	-	-	-	0.00028	-	0.00029	-
Hexachlorobenzene	0.5	-	-	-	-	-	-	0.021	-	0.00072	-	0.00074	-
Hexachlorobutadiene	5	-	-	-	0.5	70	-	0.45	-	0.45	-	50	-
Hexachlorocyclopentadiene	5	-	-	-	-	245	206	-	206	-	14,800	-	-
Hexachloroethane	0.5	-	-	-	3	35	-	-	1.9	-	-	8.74	-
Hexane	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	10	-	-	-	-	-	-	-	-	-	-	-	-
Iron, total	-	300†	-	-	-	-	-	-	-	-	-	-	-
Isophorone	10	-	-	-	-	-	5,200	-	5,200	-	520,000	-	-
Lead, total	10	50	-	20	-	-	50	-	50	-	-	-	-
Manganese, total	-	50†	-	-	-	-	-	-	50	-	100	-	-
Mercury (alkyl)	2	-	-	-	-	-	-	-	-	-	-	-	-
Mercury (inorganic)	-	2*	-	3	-	-	10	-	0.144	-	0.146	-	1.1
Methoxychlor	2	100*	-	340	-	-	-	-	100	-	-	-	340

TABLE 3-1. SUMMARY OF USEPA DRINKING WATER STANDARDS, CRITERIA, AND GUIDELINES FOR PROTECTION OF HUMAN HEALTH (Continued)
(ug/L)

					These Columns Must Be Verified by IRIS		Water Quality Criteria for Protection of Human health(g)						
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Chemical	Practical Quanti-fication Limits (a)	MCL (b)	MCLG (c)	Proposed MCLs(d)	Concentration at 10^{-6} Risk Level (e,f)	Concentration at RfD Level (e,f)	Threshold Toxicity Protection	10^{-6} Cancer Risk	Threshold Toxicity Protection	10^{-6} Cancer Risk	Threshold Toxicity Protection	10^{-6} Cancer Risk	ODW Health Advisory(h) Lifetime 70 kg Adult
2-Methyl-4-chlorophenol	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Methyl-4-chlorophenol	-	-	-	-	-	-	-	-	-	-	-	-	-
3-Methyl-6-chlorophenol	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (MIBK)	5	-	-	-	-	1,750	-	-	-	-	-	-	-
4-Methylphenol	10	-	-	-	-	-	-	-	-	-	-	-	-
Nickel, total	50	-	-	-	-	700	15.4	-	13.4	-	100	-	150
Nitrate-N	-	10,000	10,000	-	-	35,000	-	-	-	-	-	-	10,000
Nitrite-N	-	-	1,000	-	-	3,500	-	-	-	-	-	-	1,000
Nitric oxide	-	-	-	-	-	3,500	-	-	-	-	-	-	-
Nitrobenzene	10	-	-	-	-	17.5	19,800	-	19,800	-	-	-	-
n-Nitrosodimethylamine	10	-	-	-	-	-	-	0.0014	-	0.0014	-	16	-
n-Nitrosodiethylamine	10	-	-	-	-	-	-	0.0008	-	0.0008	-	1.2	-
n-Nitrosodi-n-butylamine	10	-	-	-	0.006	-	-	0.0064	-	0.0064	-	0.587	-
n-Nitrosopyrrolidine	10	-	-	-	0.02	-	-	0.016	-	0.016	-	91.9	-
n-Nitrosodiphenylamine	10	-	-	-	7	-	-	7.0	-	4.9	-	16.1	-
Odor	-	3 units†	-	-	-	-	-	-	-	-	-	-	-
Oxamic acid	-	-	-	-	-	-	-	-	-	-	-	-	-
PCB's	50	-*	-	0	-	-	-	0.013	-	0.000079	-	0.000079	-
PAHs	-	-	-	-	-	-	-	0.0031	-	0.0028	-	0.031	-
Pentachlorobenzene	10	-	-	-	-	26	-	-	74	-	85	-	-
Pentachlorophenol	5	-*/30†	-	220	-	1,050	1,010	-	1,010	-	-	-	220
pH	-	6.5-8.5	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	10	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	1	-	-	-	-	1,400	3,500	-	3,500	-	-	-	-
Pyrene	10	-	-	-	-	-	-	-	-	-	-	-	-
Radium-226 and 228	-	5(n)††	-	-	-	-	-	-	-	-	-	-	-
Selenium, total	20	10*	-	45	-	-	10	-	10	-	-	-	-
Silver, total	70	50*/90†	-	-	-	105	50	-	50	-	-	-	-
Styrene	1	10†	-	140	-	7,000	-	-	-	-	-	-	140
Sulfate	-	250,000†	-	-	-	-	-	-	-	-	-	-	-
2,3,7,8-TCDD	0.005	-	-	-	-	-	-	1.8e-7	-	1.3e-8	-	1.4e-8	-
Tetrachloroethene	0.5	-*	-	0	-	350	-	0.88	-	0.80	-	8.85	10
1,1,2,2-Tetrachloroethane	0.5	-	-	-	0.175	-	-	0.17	-	0.17	-	10.7	-
2,3,4,6-Tetrachlorophenol	10	-	-	-	-	1,050	-	-	-	1	-	-	-
Thallium, total	10	-	-	-	-	-	17.8	-	13	-	48	-	-
Toluene	2	-*/40†	-	2,000	-	10,500	15,000	-	14,300	-	424,000	-	2,420
Total dissolved solids	-	500,000†	-	-	-	-	-	-	-	-	-	-	-
Toxaphene	2	5*	-	0	-	-	-	0.026	-	0.00071	-	0.00073	-
2,4,5-TP	2	-*	-	-	-	-	-	-	-	10	-	-	52
1,2,4-Trichlorobenzene	10	-	-	-	-	700	-	-	-	-	-	-	-
1,1,1-Trichloroethane	5	200	200	-	-	3,150	19,000	-	18,400	-	1,030,000	-	200
1,1,2-Trichloroethane	0.2	-	-	-	0.6	7,000	-	0.60	-	0.6	-	41.8	-
Trichloroethene	1	5	0	-	3	-	-	2.8	-	2.7	-	80.7	-
2,4,5-Trichlorophenol	10	-	-	-	-	3,500	-	-	2,600	-	-	-	-
2,4,6-Trichlorophenol	5	-	-	-	1.75	-	-	1.8	-	1.2	-	3.6	-
Vanadium	40	-	-	-	-	315(l)	-	-	-	-	-	-	-
Vinyl chloride	2	2	0	-	0.015	-	-	2	-	2.0	-	525	-
Xylene	5	-*/20†	-	440	-	350	-	-	-	-	-	-	400
Zinc, total	20	5,000	-	-	-	7,350	5,000	-	-	-	-	-	-

TABLE 3-1. SUMMARY OF USEPA DRINKING WATER STANDARDS, CRITERIA, AND GUIDELINES FOR PROTECTION OF HUMAN HEALTH (Continued)
(ug/L)

a. Source: 52 FR 25947. Practical quantification limits presented are for standard analytical methods. It may be appropriate to use different analytical methods to achieve lower quantification limits in some cases.
b. 40 CFR 141 and 143.
c. 40 CFR 141.50.
d. 50 FR 46936; November 13, 1985.
e. Integrated Risk Information System database.
f. Assuming drinking water ingestion of 2 liter/day and body weight of 70 kg.
g. 45 FR 79318-79379; November 28, 1980.
h. U.S. EPA, Health Advisories, March 1987.
i. Based on the standard for total trihalomethanes of 100 ug/l.
j. Based on criteria for polycyclic aromatic hydrocarbons (PAHs).
k. Million fibers/liter.
l. For vanadium pentoxide.
m. See also U.S. EPA "Comparisons of Office of Drinking Water and Office of Water Regulations and Standards for 307(A) Toxic Pollutants" for updated volumes of priority pollutants.
* MCL will be proposed in the Federal Register in 1988. MCLs will also be proposed for aldicarb sulfoxide, aldicarb sulfone, atrazine, and dibromochloropropane.
† Secondary MCL.
†† a = pCi/l.

TABLE 3-2. SUMMARY OF USEPA WATER QUALITY CRITERIA FOR PROTECTION OF AQUATIC LIFE (ug/L)

	Concentration			
	Freshwater Acute Criteria	Freshwater Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria
Acenapthene	1,700[b]	520[b]	970[b]	710[b]
Acrolein	68[b]	21[b]	55[b]	-
Acrylonitrile	7,550[b]	2,600[b]	-	-
Aldrin	3.0	-	1.3	-
Alkalinity	-	20,000	-	-
Ammonia	CRITERIA ARE pH AND TEMPERATURE DEPENDENT			
Antimony	9,000[b]	1,600[b]	-	-
Arsenic (pentavalent)	850[b]	48[b]	2,319[b]	13[b]
Arsenic (trivalent)	360	190	69	36
Bacteria	FOR PRIMARY RECREATION AND SHELLFISH USES			
Benzene	5,300[b]	-	5,100[b]	700[b]
Benzidine	2,500[b]	-	-	-
Beryllium	130[b]	5.3[b]	-	-
BHC	100[b]	-	0.34[b]	-
Cadmium	3.9[a]	1.1[a]	43	9.3
Carbon tetrachloride	35,200[b]	-	50,000[b]	-
Chlordane	2.4	0.0043	0.09	0.004
Chlorinated benzenes	250[b]	50[b]	160[b]	129[b]
Chlorinated naphthalenes	1,600[b]	-	-	7.5[b]
Chlorine	19	11	13	7.5
Chloroalkyl ethers	238,000[b]	-	-	-
Chloroform	28,900[b]	1,240[b]	-	-
2-Chlorophenol	4,380[b]	2,000[b]	-	-
4-Chlorophenol	-	-	29,700[b]	-
4-Chloro-3-methyl phenol	30[b]	-	-	-
Chromium (hexavalent)	16	11	1,100	50
Chromium (trivalent)	1,700[a]	210[a]	10,300[b]	-
Copper	18[a]	12[a]	2.9	2.9
Cyanide	22	5.2	1	1
DDT	1.1	0.001	0.13	0.001

TABLE 3-2. SUMMARY OF USEPA WATER QUALITY CRITERIA FOR PROTECTION OF AQUATIC LIFE (Continued) (ug/L)

	Concentration			
	Freshwater Acute Criteria	Freshwater Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria
DDE	1,050[b]	-	14[b]	-
TDE	0.06[b]	-	3.6[b]	-
Demeton	-	0.1	-	0.1
Dichlorobenzenes	1,120[b]	763[b]	1,970[b]	-
1,2-Dichloroethane	118,000[b]	20,000[b]	113,000[b]	-
Dichloroethylenes	11,600[b]	-	224,000[b]	-
2,4-Dichlorophenol	2,020[b]	365[b]	-	-
Dichloropropane	23,000[b]	5,700[b]	10,300[b]	3,040[b]
Dichloropropene	6,060[b]	244[b]	790[b]	-
Dieldrin	2.5	0.0019	0.71	0.0019
2,4-Dimethyl phenol	2,120[b]	-	-	-
Dinitrotoluene	330[b]	230[b]	590[b]	370[b]
2,3,7,8-TCDD	<0.01[b]	<0.00001[b]	-	-
1,2-Diphenylhydrazine	270[b]	-	-	-
Endosulfan	0.22	0.056	0.034	0.0087
Endrin	0.18	0.0023	0.037	0.0023
Ethylbenzene	32,000[b]	-	430[b]	-
Fluoranthene	3,980[b]	-	40[b]	16[b]
Guthion	-	0.01	-	0.01
Haloethers	360[b]	122[b]	-	-
Halomethanes	11,000[b]	-	12,000[b]	6,400[b]
Heptachlor	0.52	0.0038	0.053	0.0036
Hexachloroethane	980[b]	540[b]	940[b]	-
Hexachlorobutadiene	90[b]	9.3[b]	32[b]	-
Lindane	2.0	0.08	0.16	-
Hexachlorocyclopentadiene	7[b]	5.2[b]	7[b]	-
Iron	-	1,000	-	-
Isophorone	117,000[b]	-	12,900[b]	-
Lead	82[a]	3.2[a]	140	5.6
Malathion	-	0.01	-	0.01
Mercury	2.4	0.012	2.1	0.025

TABLE 3-2. SUMMARY OF USEPA WATER QUALITY CRITERIA FOR PROTECTION OF AQUATIC LIFE (Continued)
(ug/L)

	Concentration			
	Freshwater Acute Criteria	Freshwater Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria
Methoxychlor	-	0.03	-	0.03
Mirex	-	0.001	-	0.001
Naphthalene	2,300[b]	620[b]	2,350[b]	-
Nickel	1,800[a]	96[a]	140	7.1
Nitrobenzene	27,000[b]	-	6,680[b]	-
Nitrophenols	230[b]	150[b]	4,850[b]	-
Nitrosamines	5,850[b]	-	3,300,000[b]	-
Parathion	-	0.04	-	0.04
PCBs	2.0	0.014	10	0.03
Pentachlorinated ethanes	7,240[b]	1,100[b]	390[b]	281[b]
Pentachlorophenol	55[b]	3.2[b]	53[b]	34[b]
Phenol	10,200[b]	2,560[b]	800	-
Phthalate esters	940[b]	3[b]	2,944	3.4[b]
Polynuclear aromatic hydrocarbons	-	-	300[b]	-
Selenium	260	35	410	54
Silver	4.1[a]	0.12	2.3	-
Sulfide	-	2	-	2
Tetrachlorinated ethanes	9,320[b]	-	-	-
1,1,2,2-Tetrachloroethane	-	2,400[b]	9,020[b]	-
Tetrachloroethanes	9,320[b]			
Tetrachloroethylene	5,280[b]	840[b]	10,200[b]	450[b]
2,3,5,6-Tetrachlorophenol	-	-	-	440[b]
Thallium	1,400[b]	40[b]	2,130[b]	-
Toluene	17,500[b]		6,300[b]	5,000[b]
Toxaphene	1.6	0.013	0.07	-
Trichlorinated ethanes	18,000[b]	-	-	-
1,1,1-Trichloroethane	-	-	31,200[b]	-
1,1,2-Trichloroethane	-	9,400[b]	-	-
Trichloroethylene	45,000[b]	21,900[b]	2,000[b]	-

TABLE 3-2. SUMMARY OF USEPA WATER QUALITY CRITERIA FOR PROTECTION OF AQUATIC LIFE (Continued) (ug/L)

	Concentration			
	Freshwater Acute Criteria	Freshwater Chronic Criteria	Marine Acute Criteria	Marine Chronic Criteria
2,4,6-Trichlorophenol	-	970[b]	-	-
Zinc	320[a]	47	170	58

[a]Hardness dependent criterion (100 mg/l used).

[b]Insufficient data to develop criteria. Value presented is the L.O.E.L.--lowest observed effect level.

4. WORK PLAN RATIONALE

Rationale for site-specific tasks to investigate potential environmental contamination at eight sites at the Toledo Air National Guard Base (ANGB) is provided in this section. The project tasks to be conducted during the investigation will include soil water sampling and analysis; soil boring, sampling, and chemical analysis; onsite gas chromatography (GC); monitoring well installation; sand point installation; surface water, sediment, and groundwater sampling and chemical analysis; field aquifer (slug) testing; investigation of waste products management; and data analysis and preparation of project bid documents, plans, and reports. The work plan will detail a base level of effort for each site. Depending on the investigation findings in the field, Science Applications International Corporation (SAIC) will make recommendations for further actions where necessary.

4.1 SITE INVESTIGATION OBJECTIVES

The objectives of the Site Investigation (SI) at Toledo ANGB require that sufficient data be obtained to:

- Determine the chemical nature and magnitude of identified constituents
- Evaluate the potential for contaminant release and migration
- Conduct a preliminary risk assessment addressing applicable or relevant and appropriate requirements (ARARs) for remediating confirmed contamination at each site
- Evaluate the necessity for immediate response actions
- Support a definitive Focused Feasibility Study/Remedial Measure (FFS/RM)
- Prepare recommendations for broader investigation activities to determine the full extent of contamination (e.g., Remedial Investigation/Feasibility Study [RI/FS] phase)
- Support no further action decisions and complete decision documents.

The data requirements for the SI phase of the project are, in general, less extensive than those necessary for the RI/FS phase.

4.2 DATA QUALITY OBJECTIVES

Analytical data are required from the Toledo ANGB SI to support site characterization, hazardous constituent characterization, evaluation of contaminant release potential, risk assessment, evaluation of remedial alternatives, and recommendations for further investigations or actions. These data use requirements indicate that the minimum appropriate analytical level is Hazardous Waste Remedial Actions Program (HAZWRAP) Level C (DOE 1989). The applicable analytical techniques will be U.S. Environmental Protection Agency (EPA) SW846 methods and procedures or other EPA-approved methods. The analytical methods used will be non-Contract Laboratory Program (CLP) methods. Recognized standards, such as American Society for Testing and Materials (ASTM) methods, will be used procedurally where appropriate. Specific data quality objectives (DQOs) for accuracy, precision, comparability, representativeness, and completeness, and specific analytical methods to be used during the initial SI, are detailed in the Quality Assurance Project Plan (QAPP). Specific sampling methods and protocols will be detailed in the SI work plan. Implemented field procedures will be accomplished in accordance with HAZWRAP Quality Control Requirements for Field Methods (HAZWRAP 1989).

4.3 WORK PLAN APPROACH

SAIC's technical approach for conducting the SI at Toledo ANGB will include a groundwater probe survey, well drilling and installation, sand point installation, hydrologic testing, and multi-media sampling. Onsite GC equipment will be used for field screening of liquid and solid samples. These tasks are summarized below, and are discussed in more detail in the SI work plan. All field activities will be conducted in compliance with the site health and safety, sampling, and quality assurance plans.

4.3.1 Groundwater Probe Survey

A groundwater probe survey will be conducted in the area of Site 5 (POL Storage Area) to delineate a JP-4 plume potentially emanating from the site. Additional groundwater probe surveys will be conducted at Sites 1, 3, and 4. Analytes for the surveys will include total petroleum hydrocarbons, benzene, toluene, ethylbenzene, and xylenes. Optional groundwater probes may be

necessary at Sites 1, 3, and 5 in the event that the base level of effort at these sites is determined to be insufficient to delineate contamination.

4.3.2 Soil Borings

Twenty-three soil borings will be drilled to investigate Sites 1, 2, 3, 4, 5, and 8: seven borings at Site 3, four borings at Site 4, three borings each at Sites 1 and 2, and two borings each at Sites 5 and 8. One boring from each site will be extended to a depth of approximately 30 feet below land surface (BLS) to provide site-specific stratigraphic information regarding the presence of a lower permeability clay layer beneath the site. The remaining borings at the sites will be drilled to 5 feet below the water table. Soil samples will be collected from the borings for physical and chemical analysis in the laboratory. Two background soil borings will be drilled at locations to be determined in the field. Background borings will extend to 30 feet BLS. The 23 borings constitute the base level of effort for the SI. Five optional borings at Sites 1, 3, and 5 may be drilled in the event that field conditions warrant additional borings at these sites.

4.3.3 Sand Point Installations

Fourteen 2-inch diameter sand points are proposed to be driven or augered into place at various locations across the Base. The shallow water table beneath the Base will make the installation of these sand points economically and technically advantageous. Hydrologic data, such as depth to groundwater, shape of the potentiometric surface, groundwater flow directions, and presence of floating product on the water table, can be collected from the sand points, and when used in conjunction with hydrogeologic data collected from the proposed monitoring wells (see Section 4.3.4), and the existing U.S. Geological Survey (USGS) well, will enable a more comprehensive hydrologic characterization of the Base area than would be attainable with fewer, more expensive monitoring wells.

The sand points will be installed before the proposed monitoring wells because these data are pertinent to selecting the final locations for those wells. Surveying of sand points for location and elevation will be initiated approximately one-third of the way into the installation program (i.e., after

approximately five installations). A complete round of water level readings will be obtained from the sand points upon completion of the program and used in conjunction with the survey data to determine groundwater flow directions and gradients. No optional sand point installations are proposed at the Base.

4.3.4 Monitoring Well Installations

Nine monitoring wells are proposed to be installed at the Base. One well will be installed at each of Sites 1, 2, 4, and 8, and the remaining five wells will be installed around Sites 3 and 5. The wells will be installed using nominal 4-inch PVC riser and screen extending 10 feet below the existing water table. The wells will be used to determine the hydrologic properties of the aquifer, groundwater flow directions, and for the chemical characterization of groundwater. Soil samples for laboratory analysis will be collected from the wells at 2.5-foot intervals during drilling. Depending on the results of the onsite screening of groundwater samples from these wells (see Section 4.3.6) and the groundwater probe survey, additional wells may be installed as optional field activities (see Section 4.3.8).

4.3.5 Hydrologic Testing

Hydrologic (permeability) testing of the proposed monitoring wells and sand points (23 total tests) will be conducted to determine the hydraulic conductivity of the aquifer. Permeability tests will be conducted using rising or falling head slug testing methodology and appropriate analytical techniques [Hvorslev (1951); Bouwer and Rice (1976); Cooper et al. (1973)] for the confined or unconfined aquifer. Hydrologic testing will be conducted after all other site activities are completed through the multimedia sampling task. Before hydrologic testing is initiated, a full round of water level and well depth measurements will be obtained.

4.3.6 Groundwater, Surface Water, and Sediment Sampling

After all monitoring wells and sand points have been installed and developed, multimedia groundwater, surface water, and sediment samples will be collected from various sampling locations. Groundwater samples will be collected from the nine monitoring wells at the sites. Surface water and sediment samples will be collected from locations within Sites 2, 5, 6, 7,

and 8, and will allow the delineation of potential contaminant movement along the drainage ditches. One groundwater sample will be collected from the Base water supply well (before entering the Base treatment system) to preliminarily assess potential contamination of bedrock underlying the Base. A full round of water level data will be collected from the monitoring well and sand point network before sampling activities begin.

4.3.7 Background Soil Borings

Soil borings will be drilled at locations on or near Base property that will attempt to represent background conditions in the Base area. The information obtained from the borings will be used for comparative purposes in determining significant health risks potentially associated with compounds detected at the sites of concern. Stratigraphic information obtained from these boreholes will be incorporated into the geologic and hydrogeologic characterization of the sites. Each boring will be drilled to the top of a silty clay layer that reportedly occurs at a depth of 20 to 25 feet. Soil samples will be collected for chemical analysis in the laboratory. The exact locations of the background soil borings will be determined during the SI field program.

4.3.8 Optional Field Activities

The proposed base level of effort described in this work plan is intended to provide sufficient characterization of physical and chemical conditions at the sites of concern based on presently available information. Identification or discovery of conditions or information that warrant further investigation may require that additional work be conducted under the SI, depending on the nature of the new information. Optional field activities that may be necessary for inclusion in the SI program include:

- Additional borings and monitoring wells
- Additional groundwater probes
- Additional groundwater, surface water, or sediments sampling rounds and laboratory analyses.

The magnitude of the effort necessary to complete the investigation of a site will be a determining factor toward either conducting additional SI work or recommending an RI. RI work will be conducted if contamination appears to be extensive at a site. Based on the information that is identified by SAIC, a determination will be made in consultation with the Martin Marietta Energy Systems, Inc. (Energy Systems) and the National Guard Bureau (NGB) Project Managers as to the course of action to be taken at the sites.

4.3.9 Data Analysis and Report Preparation

Data collected during each task of the SI will be tabulated into a coherent data base for inclusion in the SI report. Data analysis will be conducted using standard engineering and geologic practices and methods, and will in all cases cite references for specific analytical approaches used in the data evaluation. Interpretations arising from the data analysis will conform with standard engineering and geologic judgment. The SI report will include a summary of the completed work, data, interpretations of the task activities, and the conclusions reached by the SI. The SI report also will include recommendations for each site to: 1) continue with an RI, 2) initiate an FFS and RM, 3) implement immediate response actions, or 4) take no further action and complete decision documents. Recommendations will be supported by a preliminary risk assessment.

4.4 DECISION CRITERIA

Based on the findings of the SI activities, SAIC will recommend supplemental activities to complete the characterization at a particular site. Possible supplemental activities include:

- **Remedial Investigation (RI)** -- Conducted to collect the data necessary for site and waste characterization. This information is used to evaluate the performance and cost of potential remedial action alternatives for the sites of concern. Activities conducted under the RI will supplement, and be based, on recommendations from the SI. Specific objectives of an RI (as outlined in the National Contingency Plan [NCP]) are:
  - Determine the horizontal and vertical extent and magnitude of groundwater and soils contamination identified during the SI
  - Provide data to determine the potential for future contaminant migration

- Assess the risks to human health and the environment associated with identified contamination

- Define geologic and physical properties at the problem sites to evaluate potential remedial actions

- Collect engineering data in support of an FS and for design of a remedial action alternative.

- Feasibility Study (FS) -- Conducted to evaluate many remedial technologies and select the most appropriate remedial alternative for the specific site of concern (identified during an SI or an RI). An FS is conducted according to the following steps:

  1. Screening of all possible alternatives (including management methods and technologies) relevant to remedying specific site problems identified in the Installation Restoration Program (IRP) process. Screening is conducted to reduce the number of technologies to be considered. Screening is based on feasibility, cost, and environmental and public health impacts of the technology and the problem it is intended to correct.

  2. Detailed development of alternatives passing the screening, including design assumptions that will affect performance, implementability, environmental impact, or cost. Measures necessary to ensure worker safety during implementation of the alternative also are appraised in detail during this step, as are management requirements incorporated in the alternative (such as land-use controls, right-of-way acquisition, personnel training and supervision, permanent relocation, and coordination with Federal, state, and local agencies). Cost information presented for each detailed alternative will include estimates of capital costs, operation and maintenance costs, present-worth analysis, and sensitivity analysis.

  3. Evaluation of the alternatives detailed in step 2 to reduce the number of acceptable alternatives applicable to the site of concern while meeting objectives of the IRP and the NCP. Criteria used in evaluating the alternatives include engineering feasibility, cost, public health benefits, environmental benefits, and regulatory requirements.

  4. Describing each selected alternative in an FS report. Each description will include, at a minimum, the following information:

     - Conceptual design drawings

     - Engineering descriptions, including conceptual design criteria and rationale

     - Operational description of process units or other facilities

- Types of equipment required, including approximate capacity, size, and construction materials

- Unique structural concepts for facilities

- A list of additional engineering data necessary to proceed with design

- Estimated volume of material to be excavated

- Cost analysis (conducted under step 3)

- Regulatory compliance analysis (conducted under step 3), including construction and environmental permit requirements, a description of technical requirements for environmental mitigation measured, right-of-way requirements, and operating permit requirements.

- **Focused Feasibility Study/Remedial Measure (FFS/RM)** -- Conducted to identify and evaluate several options for remedial measures, select the most effective option, and provide documentation of the evaluation and selection process as quickly as possible. The FFS approach is similar in nature to the FS approach in that evaluation and selection of remedial action alternatives are evaluated in detail (three to five alternatives) rather than the universe of technology options and the large number of alternatives typically evaluated in an FS, and an RM (which can be implemented immediately) rather than a remedial action alternative (which requires a remedial designs step before implementation, as described below) is selected. An FFS is conducted when a timely control of contaminant migration is necessary to protect human health and the environment. The RM selected by an FFS can be modified or augmented with other remediation alternatives after a full FS is completed.

  Based on the results of this SI, sites requiring immediate attention will be subjected to an FFS to select remedial measures.

- **Remedial Design (RD)** -- Conducted to prepare the conceptual designs for the selected remedial action alternatives. Included in preparing a conceptual design are:

  1. Predesign activities (and report) to determine the alternative and rationale for its selection; present preliminary design criteria and their rationale, based on results of treatability studies; prepare preliminary process diagrams; evaluate long-term monitoring requirements; evaluate implementation obstacles, such as special technical problems, permits, and regulatory requirements, and health and safety requirements; prepare preliminary construction cost estimates; and establish preliminary project schedules.

  2. Develop detailed plans and specifications for the selected alternative.

3. Prepare an Operations and Maintenance Plan.

4. Prepare a construction and cost estimate.

- **Remedial Action (RA)** -- The alternative measure selected through the FS process, presented in the FS report, and conceptualized during RD activities.

- **Type "C" Services** -- Conducted following the approval of the final design of a selected RA alternative. SAIC assists Energy Systems and the NGB in preparing final contract documents and distributing these documents to interested bidders. Bid evaluation assistance will be provided as necessary. In addition, onsite technical support will be provided during the construction of the RM. If required, technically qualified personnel will be provided to attend conferences and/or visit the project site before or during construction. Under this activity, SAIC will review construction contractor submittals and check for compliance with the requirements of the contract plan and specifications.

A recommendation for additional work will be made to the Martin Marietta Energy Systems and NGB Project Managers for approval before proceeding with any scope of work items. SAIC will notify the Energy Systems Project Manager at the earliest possible time in the investigation process to minimize delays to the project schedule and subcontractor personnel and equipment. Timeliness in the approval process will be critical in mitigating any project delays.

Additional investigation activities that are warranted by the findings of the SI and are approved by Energy Systems and the NGB will be treated as optional work items. Additional cost impacts may result if demobilization and remobilization is required. Optional work items may include the drilling of background wells and borings, collection and analysis of additional soil or water samples, or additional groundwater probe surveys.

5. REPORTING

Science Applications International Corporation (SAIC) will use the following reporting mechanisms throughout the duration of the Site Investigation (SI) activities to ensure that project objectives are met and kept on schedule:

- Monthly letter progress reports summarizing contract progress will be prepared and submitted to the Martin Marietta Energy Systems, Inc. (Energy Systems) Project Manager. The reports will address any problems encountered, scope, or schedule impacts. In addition, a cost summary report will be submitted with each SAIC invoice.

- Weekly telecommunications with the Energy Systems Project Manager for informal exchange of field work progress, including completion of work, review of preliminary data, and identification of problems and proposed resolutions.

- SI work plans are developed as follows: Internal draft work plans will be submitted to Energy Systems, National Guard Bureau (NGB), and Ohio Air National Guard (OH ANG) personnel for review. A review meeting will be held at the NGB for receipt of comments, which will be incorporated into draft SI work plans. The draft SI work plans will be submitted for regulatory agency review (Ohio EPA and USEPA). A meeting will be held with the regulators at the Base. The regulatory agency review comments will be incorporated into the final SI work plan.

- After completion of all SI field activities and receipt of analytical results, an internal draft SI report will be prepared for submittal to Energy Systems, NGB, and OH ANG personnel for review. A review meeting will be held at ANGSC for receipt of comments, which will be incorporated into a draft SI report. The draft SI report will be submitted for regulatory agency review (Ohio EPA and USEPA). A review meeting will be held at the Base for receipt of review comments on the draft SI report. The regulatory agency review comments will be incorporated into the final SI report.

6. PROJECT MANAGEMENT

This section describes the project team organization and the responsibilities of key Science Applications International Corporation (SAIC) personnel for the Site Investigation (SI) at Toledo Air National Guard Base (ANGB).

6.1 ORGANIZATION

The SAIC project team for the SI includes the following key personnel:

- Program Manager
- Project Manager
- Site Investigation Manager
- Quality Assurance Officer
- Health and Safety Officer
- Project Administrator.

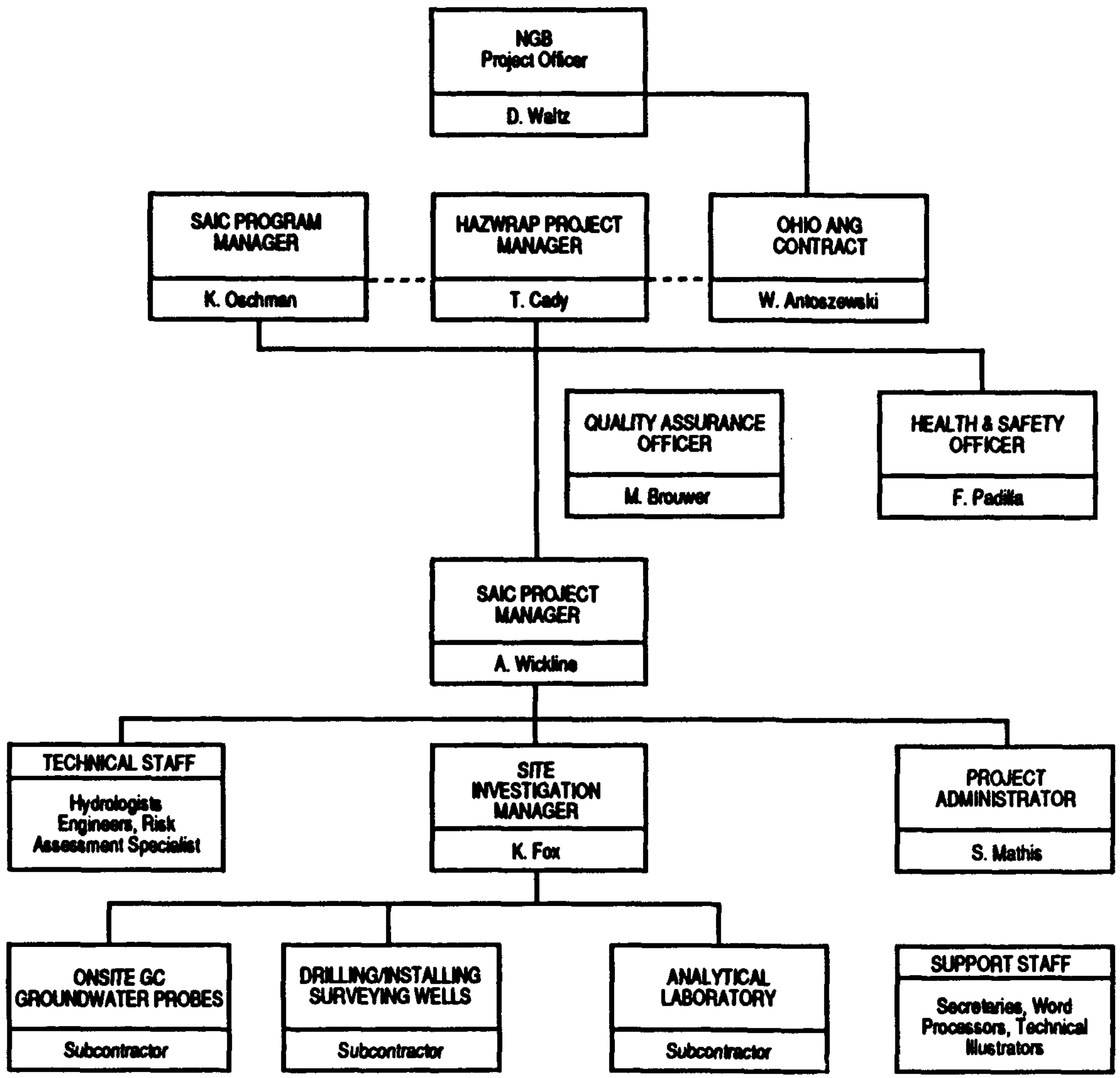
Figure 6-1 presents an organization chart for the SI team. Subcontractors will be used to provide crews and equipment for groundwater probe surveying, drilling, well surveying, and onsite chemical analyses. A subcontractor also may be used to provide laboratory analyses.

6.2 RESPONSIBILITIES OF KEY PERSONNEL

Specific responsibilities of key project personnel are summarized below.

6.2.1 Program Manager

The Program Manager is responsible for the execution of all contractual obligations. This individual serves as the primary program point of contact for the client and provides an interface between the client and the project staff. SAIC's Program Manager for the Martin Marietta Energy Systems, Inc. (Energy Systems) contract is Mr. Harvey L. (Lou) Arnold, Jr. Mr. Arnold is located at the SAIC office in Oak Ridge, Tennessee.



SAIC Science Applications International Corporation
An Employee-Owned Company

SI Project Management Structure
Ohio Air National Guard
Toledo Express Airport
Swanton, Ohio

Figure: 6-1 | Project: 1-827-03-350-02

6.2.2 Project Manager

The Project Manager is responsible for ensuring that all activities are conducted in accordance with the statement of work (SOW) and within the overall contractual obligations. The Project Manager also provides technical coordination with the Energy Systems Project Manager. This individual will monitor the project budget and schedule and ensure the availability of necessary personnel, equipment, subcontractors, and services. The Project Manager will participate in developing the field program, evaluating the findings, developing conclusions and recommendations, and reporting, and also will have primary responsibility for the technical quality of all products. The Project Manager is responsible for preparing monthly progress reports and reviewing the financial progress of the project. SAIC's Project Manager for the SI is Ms. Connie Samson, an Environmental Engineer with SAIC.

6.2.3 Site Investigation Manager

The SI Manager provides management of the field activities on the project. This individual is responsible for ensuring that technical matters pertaining to the field program are addressed. In addition, the SI Manager is responsible for all field quality assurance/quality control (QA/QC) procedures as defined in the Quality Assurance Project Plan (QAPP) and for safety-related issues as defined in the Health and Safety Plan. Mr. Christopher Manikas, a hydrogeologist with SAIC, is the SI Manager.

6.2.4 Quality Assurance Officer

The Quality Assurance Officer (QAO) is responsible for ensuring that all QA objectives of the project are met, reviewing selected field and analytical data to ensure adherence to QA/QC procedures, and approving the quality of data before they are included in the SI decisionmaking process. Ms. Mamie Brouwer is the QAO for this project, and has responsibility for ensuring that the Hazardous Waste Remedial Actions Program (HAZWRAP) QC requirements are met and for ensuring quality in the field and analytical laboratory.

6.2.5 Health and Safety Officer

The Health and Safety Officer will review and internally approve the Health and Safety Plan tailored to the specific needs of this investigation.

In consultation with the Project Manager, this individual will ensure that an adequate level of personal protection exists for anticipated potential hazards for all field personnel. The Health and Safety Officer does not report to either the Program and Project Manager; therefore, his actions are not dictated by any program or project constraints (such as budget and schedule) other than the assurance of appropriate safeguards for staff conducting the investigation activities. The Project Health and Safety Officer is Mr. Fernando Padilla, C.I.H.

6.2.6 Project Administrator

The Project Administrator is responsible for assisting the Project Manager in administrative and financial aspects of all phases of the project. The Project Administrator is Ms. Sandra Mathis. She will help ensure that monthly reporting is completed on time and that the Project Manager is aware of potential or actual budget constraints or problems. She also will assist with preparing deliverables and tracking purchases of equipment and supplies that must be delivered to the client at the completion of the project.

6.3 TRAINING

All SAIC field personnel are trained in accordance with the Occupational Safety and Health Administration (OSHA) Interim Final Standard 51 FR 45654, issued December 19, 1986, and are experienced in hazardous waste site and/or laboratory work, use of personal protective equipment, and emergency response procedures.

All SAIC personnel assigned to this project will receive the Project Management Plan, Site Investigation Work Plan, Quality Assurance Project Plan, and Health and Safety Plan in a timely manner to allow for a sufficient review period. Subcontractors will receive information from the project plans that is pertinent to their operations. A field staff orientation and briefing will be held at the Base before the initiation of investigation activities to acquaint project personnel with the site, assign field responsibilities, and provide review of the field operations and field equipment.

7. REFERENCES

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